

Michigan's Forest Resources, 2012

Research Note NRS-165

This publication provides an overview of forest resource attributes for Michigan based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) program of the Northern Research Station, U.S. Forest Service. These estimates, along with Web-posted core tables, are updated annually. For more information please refer to page 4 of this report or visit our website: <http://www.fia.fs.fed.us/>.

Table 1. – Annual estimates, sampling error, and change
Note: Volumes are for 5-inch and larger diameter trees

	Estimate	Sampling error (%)	Change since 2007 (%)
Forest land estimates			
Area (1,000 acres)	20,296	0.6	3.0
Number of live trees 1-inch diameter or larger (1,000,000 trees)	14,085	1.4	-0.1
Dry biomass of live trees 1-inch diameter or larger (1,000 tons)	854,583	1	8.2
Net volume in live trees (1,000,000 ft ³)	34,130	1.1	8.7
Annual net growth of live trees (1,000 ft ³ /year)	743,933	2.7	-3.2
Annual mortality of trees (1,000 ft ³ /year)	373,219	3.6	9.1
Annual harvest removals of live trees (1,000 ft ³ /year)	352,746	6.5	8.0
Annual other removals of live trees (1,000 ft ³ /year)	11,293	33.7	-36.5
Timberland estimates			
Area (1,000 acres)	19,685	0.6	3.0
Number of live trees 1-inch diameter or larger (1,000,000 trees)	13,641	1.5	-0.3
Dry biomass of live trees 1-inch diameter or larger (1,000 tons)	829,103	1	8.3
Net volume in live trees (1,000,000 ft ³)	33,106	1.1	9.0
Net volume of growing-stock trees (1,000,000 ft ³)	30,483	1.2	8.0
Annual net growth of growing-stock trees (1,000 ft ³ /year)	677,830	2.5	-6.0
Annual mortality of growing-stock trees (1,000 ft ³ /year)	293,369	3.9	6.5
Annual harvest removals of growing-stock trees (1,000 ft ³ /year)	309,032	6.6	5.8
Annual other removals of growing-stock trees (1,000 ft ³ /year)	13,626	30.7	-51.6

Note that changes in inventory design and definitions make it inappropriate to directly compare some previously published estimates with these current estimates. Sampling errors and error bars represent 68% confidence intervals.

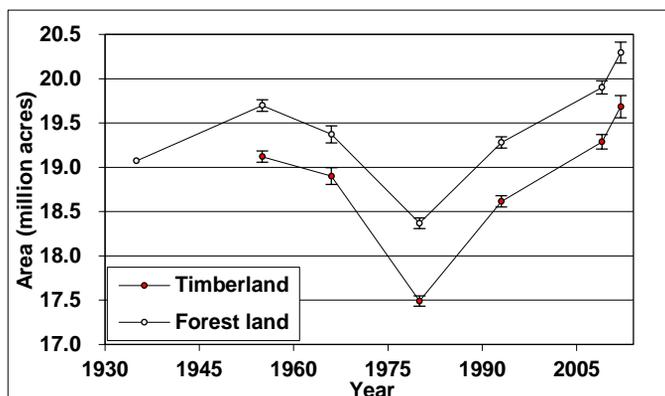


Figure 1. – Area of timberland and forest land by year.

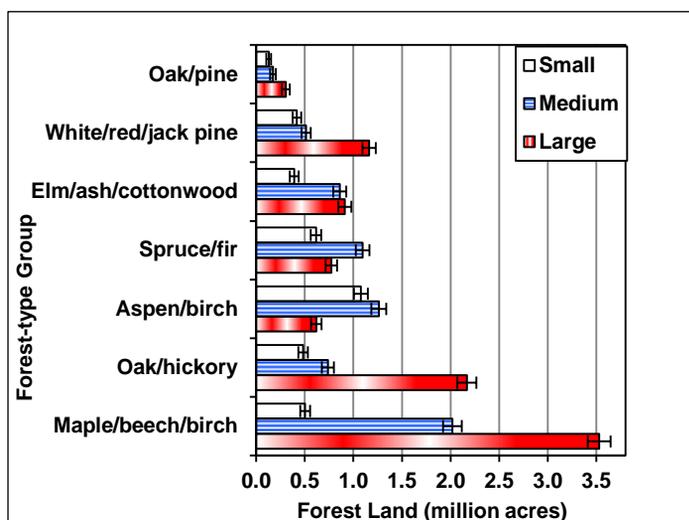


Figure 2. – Area of forest land by stand-size class (based on small, medium, and large trees) for top seven forest-type groups by acres, Michigan, 2012.

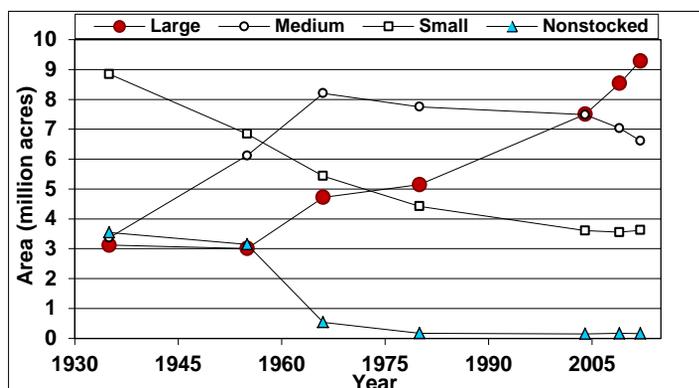


Figure 3. – Area of timberland by stand-size class (based on small, medium, and large trees) and year.

Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Table 2. – Top 10 species by statewide volume estimates, 2012.

Rank	Species	Volume of live trees 5-inch diameter and larger on forest land (1,000,000 ft ³)	Sampling error (%)	Change since 2007 (%)	Volume of sawtimber trees on timberland (1,000,000 board feet)	Sampling error (%)	Change since 2007 (%)
1	Sugar maple	5,023	3.4	8.8	12,781	4.4	19.4
2	Red maple	4,613	3.2	19.9	10,329	4.8	35.3
3	Northern white-cedar	2,847	5.1	3.4	7,451	6.4	-0.4
4	Red pine	2,356	6.0	14.6	9,595	6.4	23.0
5	Northern red oak	1,693	6.0	12.7	6,019	6.6	19.8
6	Eastern white pine	1,633	6.5	17.4	7,190	7.4	22.7
7	Quaking aspen	1,602	5.1	0.1	3,398	7.5	0.1
8	Bigtooth aspen	1,270	6.9	5.3	3,471	9.1	13.7
9	Eastern hemlock	1,050	7.5	10.9	4,192	8.6	6.8
10	Black cherry	976	6.5	16.5	2,314	9.6	30.1
	Other softwoods	2,740	3.4	-0.7	6,025	5.0	-1.0
	Other hardwoods	8,328	2.5	5.8	22,515	3.5	11.9
	All Species	34,130	1.1	8.7	95,279	1.6	15.0

Table 3. – Area and percent of forest and timberland by owner, Michigan, 2012. Change in forest and timberland by owner, Michigan, 2007 to 2012. State includes state-owned forest and timberland. Corporate includes real estate investment trusts and timber management organizations. Other private includes nongovernmental conservation and natural resource organizations; unincorporated local partnerships, associations, and clubs; and Native Americans. Other public includes local governments such as counties or townships and other federal such as U.S. Fish and Wildlife Service, U.S. Department of Defense, and U.S. Department of Energy. All National Park Service forest land is reserved by law prohibiting management for the production of wood products.

Forest land estimates	Estimate (1,000 acres)	Estimate (%)	Sampling error (%)	Change since 2007 (%)
Owner				
Family or individual	9,246	45.6	1.6	2.3
State	4,235	20.9	1.7	1.9
U.S. Forest Service	2,723	13.4	0.8	2.1
Corporate	2,685	13.2	3.9	-1.8
Other private	659	3.2	9.7	32.1
Other public	530	2.6	10.4	26.1
National Park Service	218	1.1	15.2	12.2
Total	20,296	100.0	0.6	3.0
Timberland estimates				
Owner				
Family or individual	9,169	46.6	1.6	2.2
State	4,132	21.0	1.8	1.9
Corporate	2,657	13.5	3.9	-1.3
U.S. Forest Service	2,564	13.0	1.2	2.4
Other private	659	3.3	9.7	32.1
Other public	505	2.6	10.6	26.6
National Park Service	NA	NA	NA	NA
Total	19,685	100.0	0.6	3.0

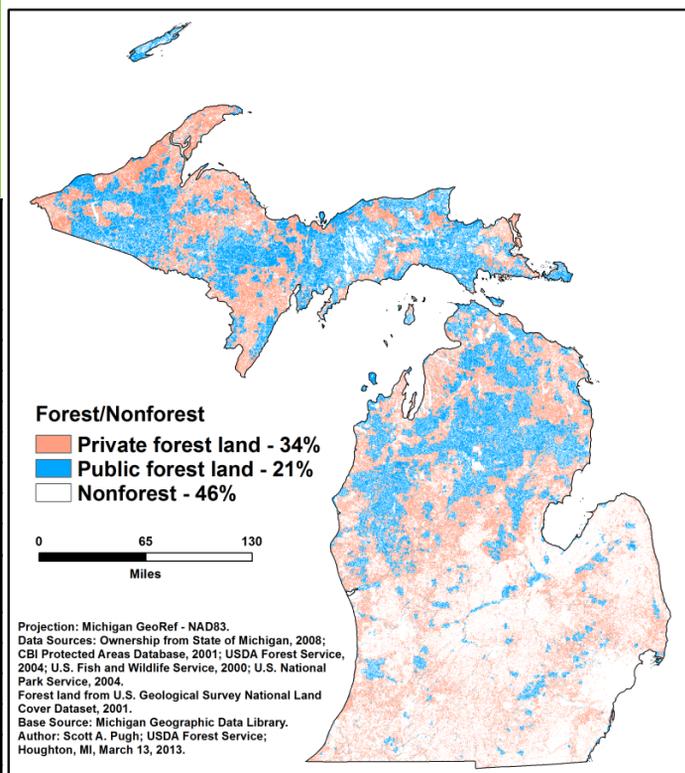


Figure 4. – Area of forest/nonforest with forest identified by major ownership group, Michigan, 2012.



Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Issue Update – Net Growth by Component

Net growth represents the change in volume of trees between two points in time (e.g., previous 2007 inventory and current 2012 inventory) accounting for gains in growth and losses from mortality but not for removal of volume due to cutting or land-use change. To help understand these changes in volume, net growth is broken down into a number of components.

FIA identifies the following components of net growth:

- Survivor growth — change in volume of live trees between inventories on land identified as forest in both inventories.
- Mortality — volume (negative) of live trees from the previous inventory that died before the current inventory. The land was forest in the previous inventory.
- Ingrowth — volume of trees that grew into a merchantable size (e.g., 5-inch diameter) since the previous inventory. The volume is not counted until the current inventory and the land is identified as forest in both inventories.
- Reversion — volume of live trees on land that is now forest but was previously nonforest.
- Diversion — change in volume of live trees between inventories on land that changed from forest to nonforest. Diversion only counts trees that remained present and living.
- Cut growth — increase in volume of live trees from the previous inventory that were cut before the current inventory. The land was forest in the previous inventory.

Mortality, ingrowth, survivor, and reversion components control most of net growth (Fig. 5). The 2012 inventory estimate of net growth on forest land is 3.2 percent less than the 2007 inventory estimate (see Table 1). Most components have changed little since 2007 except reversion (156.6 million ft³) which is more than double the estimate for 2012 (76.8 million ft³). Most of this apparent change in reversion is due to an artificially high reversion growth estimate for the 2007 inventory. Pugh (2012) determined that approximately half of the reversions, by acreage, for the 2010 inventory occurred in the 1990s to early 2000s. Since 2005 superior digital aerial imagery has been available and used along with advancements in geographic information systems to better identify reversions. There is no exact way to compensate for the effects of better imagery but the influence on the estimates will decrease annually until there is no effect by the 2017 inventory (assumes a 5-year cycle of samples is maintained).

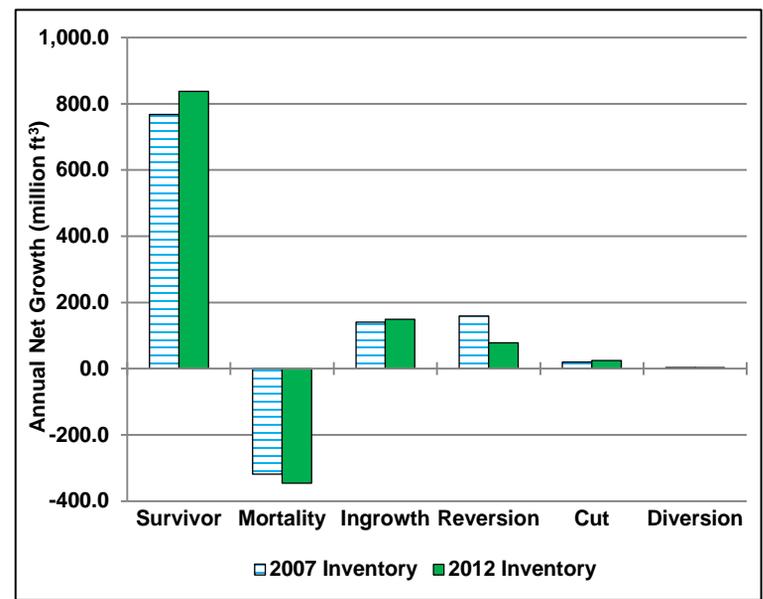


Figure 5. – Average annual net growth of live trees (5-inch and larger growing stock and nongrowing stock) by component on forest land, Michigan, 2007 and 2012.

In light of the reversion issue, the reduction in net growth at the state level from the 2007 to 2012 inventory is a data artifact and hence, not real. Conversely, the analysis of net growth components can reveal actual change. For example, the annual net growth estimate for American beech (*Fagus grandifolia* Ehrh.) dropped from 7.7 to 3.0 million ft³. There was a considerable drop in the estimate of reversion growth (1.7 to 0.4 million ft³) but the increase in mortality was more influential (-4.6 to -8.9 million ft³). The change in other components was negligible, indicating a real decrease in net growth. These findings support what others (MIDNR 2013) have reported regarding the adverse effects of beech bark disease (*Cryptococcus fagisuga* and *Neonectria*) on this important species.

The capability to analyze these components has become feasible with the recent addition of a table, tree_grm_estn, to the FIA database (<http://apps.fs.fed.us/fiadb-downloads/datamart.html>). EVALIDator 1.5.1.05 (<http://apps.fs.fed.us/Evalidator/evalidator.jsp>) also allows users to summarize estimates of net growth by a similar set of components.

Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Citation for this Publication

Pugh, S.A. 2013. **Michigan's forest resources, 2012**. Research Note NRS-165. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

FIA Program Information

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Contact Information

Lead Analyst: Scott A. Pugh, 906-482-6303 x17, spugh@fs.fed.us

Data processing/access: Mark Hatfield, 651-649-5169, mahatfield@fs.fed.us

Estimates, tabular data, and maps from report may be generated at: <http://www.fia.fs.fed.us/tools-data/default.asp>

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